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paddles at from half a mile to one mile from the shore. In order to pass the bowldery reefs, which extend from the shore north of the Albany, we were obliged to go so far out from the land that the tops of the trees were barely visible at the highest places.

"A careful track-survey of the Albany was made from its mouth to The Forks, which, with that of the upper part, also made during this season, when plotted, will enable me to map the whole course of this river, an actual survey of the intermediate portion having been made by myself in 1870. This river possesses additional importance from the fact of its constituting part of the northern boundary of the Province of Ontario."

Dr. Bell's assistants, Messrs. Macmillan and Murray, made a track-survey of part of the Albany River, leaving Bell's party at the lowest point reached by him on the Albany River.

E. Coste completed, with the assistance of J. White, a map of the Madoc and Marmora region, Ontario. We can only mention the surveys of R. W. Ells in the Eastern Townships, near the boundary of Maine, and L. W. Bailey's and R. Chalmers's work in New Brunswick.

Of no less importance are the surveys of the technical branch of the Department of the Interior, under the direction of the surveyor-general, Capt. E. Deville. A number of surveys were made near the Canadian Pacific Railway. Otto J. Klotz was put in charge of the survey of the Canadian Pacific Railway from the summit of the Rocky Mountains to Revelstoke on the Columbia River. In his report will be found an interesting table of elevations of mountain-peaks and a description of the country adjacent to that part of the railway. William Ogilvie was engaged in astronomical observations for determining the longitude of Kamloops. J. J. McArthur made an important topographical survey of those regions adjacent to the Pacific Railway which were not explored by Dr. G. M. Dawson on his reconnaissances of the Rocky Mountains. Fred. W. Wilkins was put in charge of an exploratory survey of Lake Winnipeg, of which he made a complete circuit. He gives the length of the lake as two hundred and seventy miles, its width ranging from two to sixty miles. He describes the lake as shallow, rough, and stormy, and navigation as extremely difficult and dangerous. The east coast is studded with reefs, rocks, and rocky shoals. The west coast, though having deep water in some places, is also very shallow, but its coasts are sandy and muddy. Besides this, numerous township and road surveys were made.

In 1885 the country adjacent to the Banff Hot Springs on the Pacific Railway was reserved for public use, and during the last year it has been surveyed, and roads are constructing which will make accessible the numerous sights of this Canadian National Park. In addition to the reservations at Banff, four mountain parks were reserved in 1886,—Mount Stephen and its environment, Mount Sir Donald, taking in the famous loop of the railway, Eagle Pass, and the amphitheatre at the summit of the Selkirk Mountains.

The Department of Marine was not less active in exploring the little-known parts of the Dominion. We reported on the third Hudson Bay expedition, under Lieut. A. Gordon, in No. 252 of *Science*. Commander J. G. Boulton was actively engaged in carrying on his surveys in Georgian Bay and North Channel, the results of which are published in charts of the British Admiralty, and in the 'Georgian Bay and North Channel Pilot,' which contains much interesting information on those waters.

The Indian Department was engaged in surveying and laying out reserves for various tribes, but principally for those of British Columbia; and the descriptions of the reserve commissioners are of some interest.

The provincial government were busily engaged in extending the surveys of the crown lands. The reports and descriptions of the provincial land surveyors abound with information on the townships they surveyed and divided, and we can only point out a few of the more important reconnaissances of outlying regions. In the Province of Ontario, A. Niven surveyed the outlines of seven townships adjacent to Lake Temiscamingue, in the Nipissing district. He found nearly the whole of the outline to be good farming land, the country level and free from stone. Another reconnaissance was made between Rainy Lake and the 49th parallel, from which it appears that most of the country is rough and broken, with occasional valleys of good land.

In the Province of Quebec, W. A. Ashe made a survey of the Temiscamingue region, and his report on this country agrees with that of A. Niven, who surveyed those parts belonging to Ontario. C. E. Forgues visited the numerous streams emptying on the northern coast of the Gulf of St. Lawrence, and found that they yield a considerable amount of salmon.

The exploration and colonization of the outlying districts, which were considered of no value whatever a short time ago, are progressing rapidly. Railways and colonization roads are being built and pushed forward in all parts of the country, and the newly opened districts becoming rapidly settled.

As our knowledge of Canada makes rapid progress, so the science of geography has been gaining many friends, and geographical problems are discussed by many societies. It is the subject of many papers read before the Royal Society of Canada; and among them, Capt. E. Deville's paper on the best projection for maps of the Dominion of Canada takes a prominent place. The Geographical Society of Quebec publishes in its Transactions a considerable amount of interesting information, and the associations of the Dominion Land Surveyors and those of the Provincial Land Surveyors of Ontario discuss many matters of geographical interest in their annual reports.

DR. F. BOAS.

#### MENTAL SCIENCE.

##### What the Will Effects.

UNDER this head Professor James (*Scribner's Magazine*, February, 1888) discusses the processes of voluntary action from the point of view of the 'new psychology.' The discussion is in so many respects characteristic of the rejuvenating interest with which this point of view invests the topics that have always occupied the thoughts of reflecting people, that a somewhat full account of the article will be given below, in the hope of inducing those interested in this science to read the original.

The point of advance in the 'new psychology' of the will that Professor James regards as of most value is its reference of all activity to the type of reflex action. The steps between the application of the stimulus and the accomplishment of the re-action may be short and simple, or they may be long and intricate. I may wink instantaneously at a threatened blow, or I may take a long time in deliberating how to act upon the receipt of a momentous letter. In either case the psychic process, which in the most highly developed form becomes conscious thought, is regarded as a means towards an end,—the action, the conduct. Life is an adjustment to the environment, and the new environment is ever developing in complexity and variability of the adjustments that it makes necessary. A certain kind of these adjustments are usually singled out for separate treatment under the term 'voluntary actions'; but the doctrine now generally accepted is that this class of acts has been evolved from the involuntary acts. The distinction is one of degree of complexity and other characteristics, important among which is the characteristic that in the voluntary action the act is foreseen, the idea precedes its execution, while in the involuntary mode of action the act, though perhaps foreseen as a result of remembered experience, takes place not in obedience to this foresight, but "we know what we are going to do only after we have done it." From this it follows that no act can be voluntary the first time it is performed. "Until we have done it at least once, we can have no idea of what sort of a thing it is like, and do not know in what direction to set our will to bring it about." If one attempts to move his ear, the great difficulty is to know what sort of an effort to make, and what is lacking is the remembrance of the feeling of a moving ear. This is the mental material out of which the motion is generated, and the way to proceed is to move the ear passively until we have a tolerably clear idea of the feeling of the ear when it moves, and then attempt to reproduce this feeling. We teach children to write by holding their hands in the proper position, until they know how it feels; and so, in general, unless we have a guide to direct us in the kind of effort we ought to make to secure the desired end, we must more or less trust to a chance success. There is no abstract willing into the void, and without a memory there could be no will. All our most elaborate acts of will depend for their execution on certain physiological co-ordinations, which, in

turn, have been evolved in one way or another from the instinctive expressions of our automatic life.

This idea of the intended action is not only necessary for the will: it is a sufficient incentive to it. The class of action to which Carpenter gave the name 'ideo-motor' is really the type of action. To this class belong such movements as those concerned in picking a pin from the floor while talking, or in scribbling with a pencil, or absent-mindedly taking nuts and raisins from the dish during an after-dinner chat. The deliberate eating is over, but the idea of eating as excited by the sight of the dish, "not meeting with any express contradiction, fatally passes over into action." It needs for this no separate *fiat* of the will: it is enough that no positively hindering idea should be there. The familiar dialogue of ideas that takes place when we have the ordeal of rising on a cold morning before us, illustrates the mental process admirably. We think how late it is getting, how much we have to do, how shameful it is to waste time in this fashion, and yet we remain passive and comfortable, allowing the resolution to fade away every time it seems about to pass into effect. How do we ever get up in such a case? "We suddenly find that we have got up. A fortunate lapse of consciousness occurs: we forget both the warmth and the cold; we fall into some reverie connected with the day's life, in the course of which the idea flashes across us, 'Halloo! I must lie here no longer,'—an idea which at that lucky instant awakens no contradictory or paralyzing suggestions, and consequently produces immediately its appropriate motor effects." In general, "the sole known cause for the execution of a movement is the bare idea of the movement's execution, and, if the idea occurs to a mind empty of other ideas, the movement will fatally and infallibly take place." The hypnotic subject well illustrates this principle, for it is just because his mind is empty of other ideas that he acts out so promptly and automatically any and every suggestion of the hypnotizer. Normally the mind is full of a host of ideas, and, if they harmonize with the idea that is to lead to action, they will re-enforce and quicken the act: if they conflict with it, they delay it or may prevent its realization altogether. Had we simply called up the idea, 'we have eaten enough,' this would have been sufficient to check the raising of the hand towards the confectionery on the table. This fact of one brain-process interfering with another, physiology terms 'inhibition,' and sees in it no more (and also no less) a mystery than in the fact of stimulation itself. The reason, then, why, with a constant stream of thought passing through one's mind from morning till night, there are so few that lead to action, is because the various things thought of at once meet with contradictory thoughts, and do not conspire with the action. "They are not consented to. 'Consent,' in short, is a word which describes most of our activity far more accurately than 'volition' does." The volition would quite as often consist in refusing this consent. The lack of power to refuse this consent, to call up the contradictory ideas with sufficient vividness, is what characterizes the slave to passion. The drunkard finds himself preparing to drink at the sight of every bottle and glass, not because he does not realize the consequences of his act, but because he does not refuse his consent to it. "This is why volcanic natures like the Mahomets, the Luthers, and the Bonapartes, are usually fatalists. They find themselves bursting into action with an energy at which they are themselves astonished, as if some god or demon had released a spring."

Having thus considered involuntary actions, and the action following upon the volition of consent, there remains the most highly evolved type of actions, such as depend upon the volition of effort. The 'new psychology' naturally rejects the notion that the will is an outside force exerting its influence upon conduct in a very remote and contra-physical manner, and regards the will as bound down by the conditions of nerve-cell and muscle quite as much as are the simpler acts of a sentient being. The effort does not supplant the ideas: it simply enables us to hold them fast, so that they may become vivid enough to make the physical machine obey. When laboring under a passion, the difficulty in acting rationally is not a physical one. It is as easy, physiologically considered, to perform the movements that lead to the fleeing from temptation as those that yield to it. The difficulty is a mental one. It is the difficulty of getting the idea of the rational conduct to stay before the mind at all. The effect of a strong emotional state is to shut out all

ideas that do not harmonize with the satisfaction of the emotion. All others are hushed, and allowed no audience. "The cooling advice which we get from others when the fever-fit is on us is the most jarring and exasperating thing in life." If the rational ideas can ever get a hearing, the crisis is past; for with the new ideas come new tendencies to action, that lead away from passion, and so avert the evil. The strain of the will consists in the keeping the attention fixed on such ideas as the better conscience knows to be warranted, and in keeping down the conflicting notions. "Consent to the idea's undivided presence,—this is the effort's sole achievement: its only function is to get this feeling of consent into the mind." And from this view, it is as good a case of willing if I give my consent to the table's moving as to the movement of my own legs. In the one case the consent is so connected with a nervous system (which connection itself is liable to disturbance by disease), that the act follows from the consent: in the other no such connection exists. In principle the two cases do not differ: the mental prerequisite of the willed action is present.

The moral effort, then, that we have constantly to perform in life, is the overcoming of the resistance which certain ideas offer to being attended to at all. The resistance may be internal, as the uncongeniality of the task; or external, as conflicting with the mood of the mind at the moment: for example, the thought of tomorrow's task while enjoying one's self at an evening's entertainment. We almost involuntarily decide not to think of that, and so frighten the spectre away. But the moral act is the attending to the thought under such circumstances, until it results in action. And the free-will controversy from this point of view resolves itself into the amount of effort that it is possible to put forth in the way of holding an unwelcome idea in the mind.

The answer to the question, 'What happens when we exert our will?' is, according to Professor James, that 'we simply fill our mind with an idea which, but for our effort, would slip away.' This at once opens up a host of ethical considerations which are treated not in the usual manner of omitting the really difficult points and dwelling upon the easy ones, but by manfully facing the real question. A few citations must suffice to suggest the tone of the view which the article upholds. The first lesson drawn from the psychology of the will is that "the will has as much to do with our beliefs and faiths as with our movements. It is, in fact, only in consequence of a faith that our movements themselves ensue. We think of a movement, and say, 'Let it ensue. So far as we are concerned, let it be part of reality.' This is all that our mind can do: physical nature must do the rest." This is the method of attaining a belief: we let our mind fill with it, and drive other thoughts out of the field. Were the problems of life perfectly simple, and the lessons that nature teaches perfectly clear and unambiguous, there would be no great difficulty in selecting a view and adhering to it. "But these ostrich-like attitudes are both of them [i.e., that of the dogmatic spiritualist and the dogmatic materialist] getting harder than ever to maintain." "So long as our mind is assailed in two such different ways, it is quite idle to talk of its being passive and will-less until the objective truths shall have written themselves down. They write down no messages which are both coherent and universal." Look at the men who at the present day feel life on all its sides, and yet who are incapable of volition in intellectual affairs, and imagine that there ought to be some sort of truth with which they can remain in passive equilibrium. Their feelings make them shiver at the materialistic facts, while their loyalty to science makes them dread to be dupes of their feelings. "But the men of will do not let 'I dare not' wait upon 'I would' in any such sorry fashion. They choose their attitude, and know that the facing of its difficulties shall remain a permanent portion of their task." "No more in the theoretic than in the practical sphere do we care for, or go for help to, those who have no head for risks, or sense for living on the perilous edge."

A STUDY OF HYPNOTISM.—In the current number of the *North American Review*, Dr. Gilles de la Tourrette, a pupil of Charcot, gives an account of the views of the several varieties of hypnotic sleep which the French school have developed. While the article gives nothing that is new, it is a convenient and authoritative exposition of the work that has occupied so much of the attention of the workers at the 'Salpêtrière.'